

PATENT SPECIFICATION

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(54) A DEVICE FOR AUTOMATICALLY FILLING SYRINGES, MORE PARTICULARLY WITH RADIOACTIVE PRODUCTS

(71) We, COMMISSARIAT A L'ENERGIE ATOMIQUE, an organisation created in France by ordinance No. 45—2563 of 18th October, 1945, of 29 rue de la Federation, Paris 15e, France, do hereby declare the invention, for which we pray that a patent may be granted to use, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a device for automatically filling syringes, more particularly with radioactive products.

One important application of the device is to pharmaceutical radioactive control circuits. It can perform the filling quickly and accurately, and has the further advantage of providing complete protection against contamination, when used with radioactive products, e.g. for filling Pravaz syringes.

The operations performed by means of the device are quite safe, since they are started by the operator from an electric controlled desk which, in the case where radioactive products are manipulated, is disposed outside a radioactively sealing-tight chamber in which the device is disposed.

According to the invention there is provided a device for continuously filling syringes, the device comprising the following components, mounted on a frame; firstly, a slide bearing tongs and an abutment member disposed above the tongs, the space between the tongs and the abutment member receiving a bottle, a motor for vertically moving the slide within given limits, a micro-switch for the upper limit of the slide, a motor for tightening and loosening the tongs, two microswitches for stopping the motor at the end of the tightening and at the end of the loosening operation and, a vertical disc disposed below the abutment member and the aforementioned components and bearing a fork and stationary jaws, a space being formed between the fork and the jaws for

receiving a syringe, and a movable component or sliding gear aligned with the fork and the jaws, the sliding gear being adapted to receive the piston tappet of the syringe and secure it via a ring; a motor adapted to rotate the vertical disc about a horizontal axis, a motor for moving the sliding gear on the disc and modifying its distance from the jaws, and a control switch for each motor.

The invention will now be described by way of example with reference to the accompanying drawings, in which:—

Figure 1 is a view in elevation of the device according to the invention;

Figure 2, which shows the case where radioactive products are manipulated, is a vertical section through a chamber containing the device according to the invention; and

Figure 3 is a diagram of the control desk for the device according to the invention.

As shown in Figure 1, the device comprises on frame 1; a slide 2 bearing two tongs 3 (only one of which is shown in Figure 1); an abutment member 4; a motor F₁ for vertically moving slide 2 within given limits; a motor F₂ for tightening and loosening the tongs 3; a vertical disc 5, disposed below the abutment 4, and bearing a fork 6 and stationary spring jaws 7; a component 8 which can move on disc 5 and is called a sliding gear; a motor S₁ for rotating disc 5 around its horizontal axis; a motor S₂ for vertically moving sliding gear 8 on disc 5 so as to vary the spacing between the top part of the sliding gear and jaws 7. A desk 9 (see Figure 3) is provided with various buttons for actuating motors F₁, F₂, S₁, S₂. Sliding gear 8 is protected by a cover 10.

It is assumed, in the following description, that the device according to the invention is for use in manipulating radioactive products, under these conditions, it should be disposed in a radioactively sealing-tight chamber 11 (Figure 2) which can be an existing chamber, owing to the small volume of the device. It

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can be assembled from the chamber roof without modifying the chamber; it is secured e.g. by an axially vertical suspension column 12, a handle 13 for manipulating the column up and down along its axis and a counterweight 14.

The device according to the invention is adapted for automatically filling syringes 15 with a product contained in a bottle 16.

The device operates as follows (Figures 1 and 3):

1. The device is energized by a "stop-go" switch MA (Figure 3).

2. A throw-over switch f_1 is tilted into the "lift" direction, first switching on motor f_1 which lifts slide 2, acting via a screw 21 and a bevel gear 22. A microswitch (not shown) stops slide 2 at the end of its travel.

3. Throw-over switch f_2 is tilted into the position for loosening tongs 3, thus switching in motor f_2 which opens the tongs.

It should be noted that tongs 3, the aims of which open and shut in scissor-like fashion about their shaft 17, are normally tightened by a spring 18; they are loosened by a cam 19 mounted on the shaft 20 of motor f_2 . Two micro-switches (not shown) stop motor F_2 at the positions where the loosening and the tightening operations have been completed.

4. Accordingly, when slide 2 is in its top limit position and tongs 3 are open, a bottle 16 is gripped by gripping means (not shown) manipulated from the outside of chamber 11, and the end of the bottle is presented against abutment 4.

5. Throw-over switch f_3 (Figure 3) is tilted into the tightening position, thus switching on motor F_3 , which tightens tongs 3 around the neck of bottle 16.

6. If the sliding gear 8 is in the reverse position 24' with respect to the position shown in Figure 1, the throw-over switch s_1 (Figure 3) is tilted to the position where it acts on motor S_1 , so that the latter, acting via disc 5, moves the sliding gear into the position which it occupies in Figure 1.

7. Throw-over switch s_2 is tilted to the "piston driven-in" position and switches on motor S_2 , which drives sliding gear 8 in the direction of jaws 7. The limit micro-switch (not shown) stops the sliding gear when it reaches the position shown in Figure 1.

8. An empty syringe 15 is gripped by gripping means (not shown) manipulated from the outside of chamber 11, and the syringe, after its piston 23 has been completely driven in is secured by inserting the syringe needle 24 between the arms of fork 6 (against which dome 25 abuts), and by subsequently inserting, by simple pressure, the lugs of the syringe into jaws 7; the syringe tappet 26 is jammed against sliding gear 8 by a ring 27.

9. Switch f_1 (Figure 3) is tilted to the "bottle lowering" position, whereupon it

acts on motor F_1 , which lowers bottle 16 to its bottom position (shown in Figure 1), where bottle stopper is impaled on the syringe needle 24.

10. Switch s_2 (Figure 3) which switches on motor S_2 , is used to lower the sliding gear 8, which pulls piston 23 downwards so that the required quantity of product is sucked from the bottle 16 into the syringe. The suction is stopped by moving switch s_2 to another position, i.e. "piston-out" position.

11. Bottle 16 is lifted again, by means of switch f_1 .

Syringe 15 is then ready for an injection and merely has to be withdrawn from the apparatus. If, however, it is desired to discharge the syringe in pipette fashion, it is left secured to fork 6 and jaws 7, and switch s_1 (Figure 3) is tilted to the "needle downwards" position, thus switching on motor S_1 which, acting via disc 5, rotates the sliding gear and syringe 15 through 180°. Consequently, the syringe needle 24 occupies the position denoted by 24' in Figure 1.

After needle 24' has been placed above a selected receptacle 28, e.g. by means of an operating handle 13 (Figure 2), switch s_2 is tilted to the position in which it switches on motor S_2 , which moves sliding gear 8 towards jaws 7. In this manner, the product in the syringe is continuously ejected into receptacle 28, if switch s_2 is kept in the last-mentioned position. If, on the other hand, it is desired to introduce the product drop by drop, pressure is exerted on switch s_2 for short periods.

Since all the aforementioned operations are limited by micro-switches, there is no danger of mishandling resulting in the destruction of the apparatus.

The chamber 11 surrounding the device according to the invention can comprise gloves 29 used for manipulation.

WHAT WE CLAIM IS:—

1. A device for continuously filling syringes, the device comprising the following components, mounted on a frame: firstly, a slide bearing tongs and an abutment member disposed above the tongs, the space between the tongs and the abutment member receiving a bottle, a motor for vertically moving the slide within given limits, a micro-switch for the upper limit of the slide, a motor for tightening and loosening the tongs, two microswitches for stopping the motor at the end of the tightening and at the end of the loosening operation and, a vertical disc disposed below the abutment member and the aforementioned components and bearing a fork and stationary jaws, a space being formed between the fork and the jaws for receiving a syringe, and a movable component or sliding gear aligned with the fork and the jaws,

- the sliding gear being adapted to receive the piston tappet of the syringe and secure it via a ring; a motor adapted to rotate the vertical disc about a horizontal axis, a motor for moving the sliding gear on the disc and modifying its distance from the jaws, and a control switch for each motor.
- 5 2. A device for continuously filling syringes, said device being substantially as described and as shown in the accompanying drawings. 10

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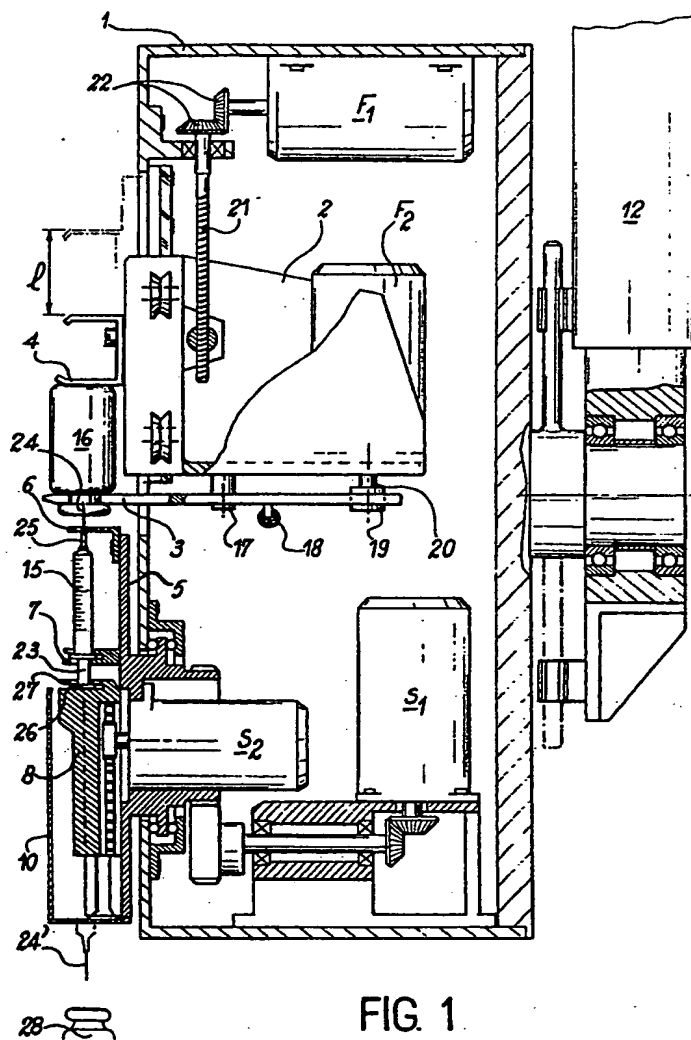
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1415804 COMPLETE SPECIFICATION
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the Original on a reduced scale*
Sheet 1

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3 SHEETS

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Sheet 1



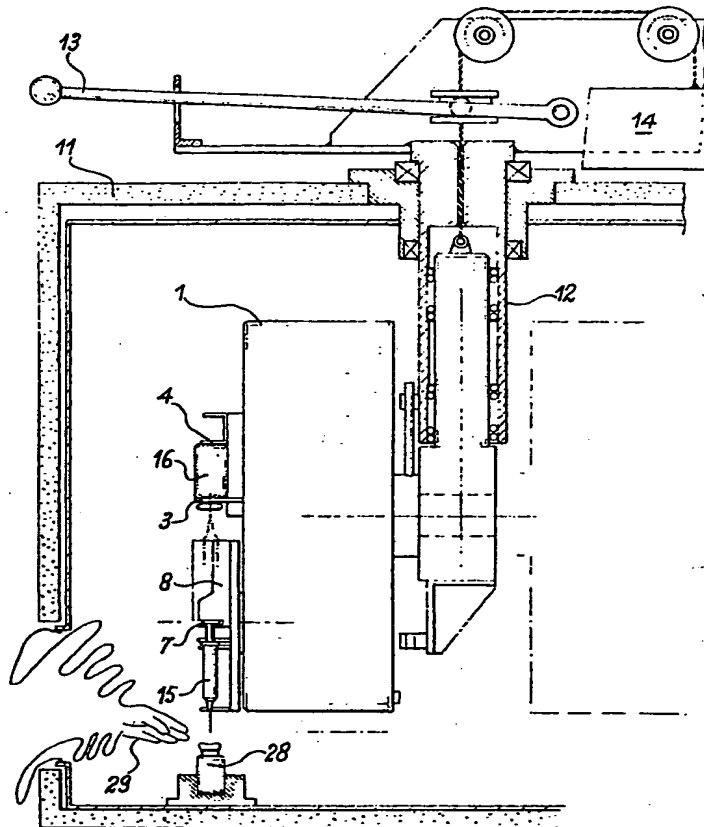


FIG. 2

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Sheet 3*

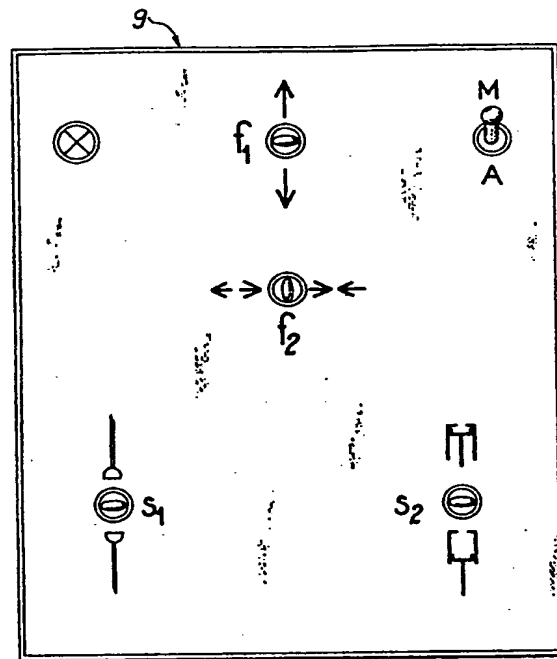


FIG. 3